Press release for CPhI / ISCE 2010

Efficient Processing being nominated for Award

Manufacturing Concepts for Microreactors and Continuous Flow Chemistry

At the CPhI / ISCE 2010 fair, taking place in October in Paris, the jurors for CPhI Innovation Awards nominated Microinnova as one of only six finalists for its concepts on microreactors and flow chemistry.

In pharmaceutical manufacturing, maintaining flexibility, known from batch processing, is a basic requirement. The cutting edge in continuous processing is the respective process performance. In order to achieve the targeted goals, both advantages will have to be combined. Additional performance may be gained by process intensification – realized e.g. by deploying microreactors, micro heat exchangers, and ultrasound. In order to go for further technological improvement, Microinnova has entered into cooperation with the **Christian Doppler Laboratory for Microwave Chemistry (Prof. Oliver Kappe), University of Graz**.

Microinnova has launched a pharmaceutical plant, based on microreactors and flow chemistry, featuring a throughput rate of 200 liters per hour. The plant relies on one of three fundamental conceptions regarding the deployment of microreactors and continuous flow chemistry:

Starting point for the **Plant Redesign-Concept** is one single process step, or similar processes in existing chemical and pharmaceutical plants, respectively. Goal is to achieve best results with integrated microreactors or alternative micro-structured components, at specific points and with a minimum of efforts.

The **Unit Operation-Concept** implements individual reaction steps in a continuous process without alternating the remaining process steps. This concept is a common solution to inefficient or difficult process steps, and is typically used with new chemical and pharmaceutical plants for one process step. It is realized in form of a skid construction, comprising all related aggregates and measuring devices.

The **Modular Multipurpose-Concept** generates a solution to maximize flexibility and performance. The inter-combinable and replaceable modules, such as feed module, reactor module or residence-time module, facilitate the creation of temporary chemical

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plants for most various purposes, adapted to the respective product. The Modular Multipurpose-Concept combines the advantage of batch technology - its flexibility - with the benefits provided by continuous process management - process performance.

Case studies:

- In May 2010, a skid, serving to execute a critical reaction step for the synthesis of an active pharmaceutical ingredient, has been implemented by Sandoz. The reaction step is mixing-sensitive, and barely feasible in batch mode. The capacity of the dedicated plant amounts to a total throughput of 200 liters per hour. The yield difference between the lab plant system (non-GMP) and the full scale plant (GMP) is at 0.1 %. The manufacturing plant was realized without performing any pilot plant trials. This plant is based on the Unit Operation-Concept (see photo 1, below).
- Microinnova has performed basic engineering for a modular plant concept serving to execute different synthesis tasks in up to three steps for the synthesis of active pharmaceutical ingredients and intermediates. The respective plant design enables the producer to adjust the plant to the synthesis tasks' specific requirement. This concept was applied by Sigma-Aldrich as well as by another (TOP 10)-company in the pharmaceutical industry (confidential). This is an example for the Modular Multipurpose-Concept.

CPhI / ISCE exhibition stand:
hall 4, stand 4G32

Presentation for CPhI Innovation Awards:
Tuesday, October 5th, 11 a.m. (hall 6, stand 6K48)

Speech at ICSE Speakers Corner:
„Reasons not to work with continuous flow processing and microreactors in development and on manufacturing scale: A critical discussion of chances and risks"
Thursday, October 7th, 3 p.m. (hall 4, stand 4F80)

Royalty-free photos (available on request):

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Photo 1: production plant with UNIT OPERATION-Concept, including microreactor

Photo 2: efficient processing makes you smile!